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BOOK REVIEWS.

DIE BIOGENHYPOTHESE, EINE KRITISCH-EXPERIMENTELLE STUDIE ÜBER DIE VORGÄNGE IN DER LEBENDIGEN SUBSTANZ. Von *Max Verworn*, Professor der Physiologie und Direktor des physiologischen Instituts an der Universität Göttingen. Jena: Verlag von Gustav Fischer. 1903. Pages, 114.

The indefatigable author, Max Verworn, professor of physiology in the University of Göttingen, publishes his views concerning the theory of life, in a special brochure, because he thought an extended report of his own experiments and conclusions would be out of place in a text-book on physiology. Accordingly, the present publication may be considered as a kind of postscript to his larger work. The subject is as important as it is fascinating, and although the author has not succeeded in giving a definite solution of the problem,—a result which the most sanguine physiologist would not expect under the present circumstances,—the reader will be indebted to him for valuable suggestions, and a condensed report of the work done by the author in the same line.

Professor Verworn refers to the fermentation theory which has recently gained so much ascendancy, but without rejecting it proposes a theory of his own. The discovery of Prof. E. Buchner, published in his essay on alcoholic fermentation (Berlin: *Deutsche Chem. Ges.*, 1896, 1898, 1899), is based on the observation of the enormous activity of enzymes of all kinds, possessed of a character which proves the kinship of all zymic masses to vital processes of animal life. Professor Verworn calls those mysterious combinations which are the carriers of the life-process *biogens*; but he thinks that nitrogen rather than oxygen is the active element of the vital processes. He follows in this respect the English physiologist Allen, who seeks the mystery in the function of molecules, saying:

"It is a molecule of enormous size, and (so far as the dynamic elements are concerned) its various groups are linked together by many nitrogen atoms, which are placed internally but not in chain. It is not a proteid, a cyan-compound, an amid, an amine, nor an alkaloid, but something that can yield some of these during life and others at its death. Death consists in the relaxation of the strained relationship of the nitrogen to the rest of the molecule. When thus 'the silver cord is loosed' the released groups fall into a state of repose. Most of these groups are

proteids in which the *N* is peripheral, triad, and unoxidised, having yielded its *O* to some other element: if however such a proteid molecule be applied to a living cell, it can be linked on again by its *N*, which thus once more becomes central."

In the same way, Professor Verworn believes that in the center of metabolism there is a highly complicated labile structure which by assimilation and dissimilation performs the vital processes. He seeks the seat of biogen in the protoplasm, but not in the nucleus, and thinks that it is a very complicated nitrogenous carbohydrate. The living cell contains a reserve of oxygen as well as of nutriment, but this oxygen is latent and the reserve of nutriment is considerable. Professor Verworn does not believe that he has solved the problem, but he thinks that his hypothesis is fruitful and may be serviceable as a guide in further speculations and experiments. While the biogen hypothesis is rather a continuation of the old physiological views, he trusts that it is not in contradiction to the enzym hypothesis, and believes that in all essential points the results of the two will be found to be compatible.

P. C.

DIE NEURONENLEHRE UND IHRE ANHÄNGER. Ein Beitrag zur Lösung des Problems der Beziehungen zwischen Nervenzelle, Faser, und Grau. Von *Dr. Franz Nissl*, a. o. Professor in Heidelberg. Mit 2 Tafeln. Jena: Verlag von Gustav Fischer. 1903. Pages, vi, 478. Price, 12 Marks.

The neuron theory is at present pretty generally accepted by physiologists, but our author, Prof. Franz Nissl, of Heidelberg, deems this theory to be a general misfortune because it endangers scientific progress. According to the neuron theory, the nervous system, and especially the brain, is comparable to a forest which, from a certain distance, appears like a carpet and spreads over a range of hills. In spite of the continuity of the green texture, we know that its elements consist of single trees whose spreading branches intertwine. Their processes may be very long, according to the conditions of their growth, but after all they all have a central origin somewhere, and the whole is a conglomeration of single individual cells. This theory was in the air long before it assumed concrete shape. It was first suggested by the different directions of the sensory and motor fibres in which growth and trophic characters always followed the same lines. Through Golgi's method we learn to distinguish between sensory and motor fibres, and Gudden formulated the theory in a definite law. Waldeyer gave a name to the new unit by calling the nervous cell with its several processes a neuron. Ramón y Cajal is one of the most prominent defenders of this theory, which in Germany is also represented by Hoche, Verworn, His, Edinger, Lenhossec, etc. Professor Nissl considers the development of sensory and motor fibres on trophic lines, but he denies that the neuron theory satisfies the conditions of the adult brain. He thinks that there is another element unaccounted for which cannot be regarded as a mere outgrowth of the neurons; and this is the gray substance of the nervous system. He deems its existence as an independent element an undeniable fact;